Remarks

Prior to this amendment, claims 1-9 were pending. Claim 1 is amended herein and claim 9 is canceled. Support for the amendment of claim 1 can be found in the specification at paragraphs [0043] and [0099].

No new matter is introduced by the foregoing amendments. After entry of this amendment, **claims 1-8 are pending in this application**. Consideration and allowance of the pending claims is requested.

Restriction/Election

Applicants thank Examiner Baggot for rejoining Groups I and II. Claim 9 is withdrawn.

Claim Objections

Claims 1-8 are objected to because "ANT1" is an abbreviation. Claim 1 is amended to spell out the abbreviation as "Anthocyanin 1". Claims 2-8 depend, directly or indirectly, from claim 1. In light of the amendment of claim 1, Applicants respectfully request that the objection of claims 1-8 be withdrawn.

Claim 3 is objected to as allegedly being of improper dependent form for failing to further limit the subject matter of a previous claim because the definition of ANT1 does not encompass "mutant." Applicants disagree. The definition of ANT1 in the specification specifically refers to "homologues, **variants** and fragments thereof" as being encompassed by ANT1 (paragraph [0035], emphasis added). Moreover, the specification at paragraph [0059] states that "[v]ariations in the native full-length ANT1 nucleic acid sequence described herein, may be made, for example, using any of the techniques and guidelines for conservative and non-conservative mutations…to produce nucleic acid sequences encoding ANT1 variants." Thus, contrary to the statement in the Office action, ANT1 does encompass "mutants" and claim 3 is not broader than claim 1. In light of the above arguments, Applicants respectfully request that the objection of claim 3 be withdrawn.

Claim Rejection Under 35 U.S.C. 112, first paragraph (enablement)

Claims 1-4 and 7 are rejected under 35 U.S.C. 112, first paragraph, as the specification allegedly fails to provide enablement for a method of obtaining any flavanoid or any isoflavone in any plant. Applicants respectfully traverse this rejection.

Applicants thank Examiner Baggot for acknowledging that the specification is enabling for "a method of obtaining or isolating the anthocyanins listed in Table 2 from tomato, the anthocyanins cyanidine-3-glucoside and cyanidine-3-rutinoside from tobacco, and glycitein (an isoflavone) from tomato." However, Applicants respectfully disagree that the specification "does not provide enablement for a method of obtaining *any flavonoid* or *any isoflavone in any plant*." At the time this application was filed, it was well known in the art how to analyze flavonoids (for example, anthocyanins and isoflavones) obtained from plant tissue (see, for example, the specification at Examples 7 and 8). The specification also teaches how to transform various diverse species of plants (tomato, tobacco, and *Arabidopsis*) with ANT1. Thus, based on the teachings of the specification and the knowledge of one of skill in the art, it would be simply a routine matter to transform any plant species with ANT1 and obtain any flavonoid from the transformed plant. Nevertheless, solely to advance prosecution in this case, claim 1 is amended to recite "extracting a flavonoid produced by the plant" (emphasis added).

The Office action alleges that "Applicant does not teach a method of obtaining any flavanone-type flavanoid in any plant species that do not produce flavanones because they do not possess a flavonoid 3'-hydrolase (F3'H) and/or a flavonoid 3'5'-hydroxylase (F3'5'H) . . ." (Office action at page 5) and that "the state of the art for producing any number of isoflavonoids in non-isoflavonoid producing plants is unpredictable because enzymes such as chalcone isomerase in non-leguminous plants do not use isoliquiritigenin and therefore expressing an ANT1 enzyme to form an isoflavone in a non-leguminous plant would not result in the production of genistein or daidzein" (Office action at paragraph bridging pages 7 and 8). Applicants disagree. The specification teaches that over-expression of ANT1 results in elevated levels of anthocyanins or glycitein, whereas these compounds are undetectable (or nearly undetectable) in the corresponding wildtype plant (see, for example, paragraphs [0191] and [0195]). Thus, the specification teaches that the failure to detect a particular flavonoid in a

wildtype plant does not preclude its production and accumulation in the plant under the appropriate conditions (for example, the overexpression of ANT1). Moreover, the claims, as amended, include the step of "extracting a flavonoid produced by the plant" (claim 1, emphasis added). Thus, the claimed method does not encompass using ANT1 overexpressing plants that do not produce flavonoids.

The Office action also alleges that de Pater *et al.* (*Plant Molecular Biology,* 34:169-174, 1997) demonstrates that a homolog (Rap-1) of the Lc maize R-type myc transcription factor does not induce anthocyanin biosynthesis when transformed into pea (unlike its homolog), "demonstrating that anthocyanin phenotype producing transcription factors have unknown and divergent roles in regulating anthocyanin or isoflavone biosynthetic metabolism in plants" (Office action at page 6). Applicants submit that comparing Rap-1 and Lc with ANT1 is irrelevant. First, de Pater *et al.* does not present any evidence that Rap-1 can regulate anthocyanin biosynthesis in any plant species and, in fact, admits that "RAP-1 is not functionally equivalent to Lc" (page 173, right column). Thus, the statement that Rap-1, like Lc, is an "anthocyanin phenotype producing transcription factor" is not accurate. Second, de Pater *et al.* compares two different proteins with two different activities, whereas the claims of the subject application are specifically directed to methods of obtaining flavonoids from plants that overexpress a single transcription factor (ANT1). Moreover, the specification teaches that ANT1 has an effect on flavonoid biosynthesis in each plant species tested (tomato, tobacco, and *Arabidopsis*). Thus, Applicants respectfully submit that the Office action's comments with regard to unpredictability, vis-à-vis de Pater *et al.*, are not relevant to the claimed methods.

In addition, the Office action alleges (Office action at page 8) that "[a]ccording to *some of the inventors*, overexpression of ANT1 *failed to produce ANY flavonoid*" and that "Mathews also reports the detection of 9 different anthocyanins in *ant1* transformed tomato but no flavonoids other than those in Table 2. For example, Mathews DOES NOT TEACH a method of obtaining any *flavanones, aurones* or *isoflavones* via overexpression of ANT1" (Office action at page 8). Applicants disagree with this characterization of Mathews (Mathews *et al.*, *The Plant Cell,* 15:1689-1703, 2003). There is no indication in Mathews that the presence of flavonoids other than anthocyanins, specifically, was tested. For example, there is no teaching in Mathews

that steps were taken to measure the levels of flavanones, aurones, or isoflavones, and that these flavonoids failed to be detected. In fact, the specification (and not Mathews) teaches that at least one isoflavone (glycitein) is detected in ANT1 overexpressing tomato plants. Thus, Applicants respectfully submit that Table 2 in Mathews is not a complete representation of the flavonoids present in an ANT1 overexpressing tomato plant. As a result, based on Mathews, one cannot draw the conclusion that "overexpression of ANT1 *failed to produce ANY flavonoid*," as suggested by the Office action.

Finally, the Office action specifically points out that Mathews teaches that "genes that encode proteins in the early and late biosynthetic pathways of anthocyanin synthesis, *CHS* and *DFR*, were upregulated in *ANT1*-overexpressing plants" (Mathews, page 1695, right column). As CHS (chalcone synthase) is an enzyme that is common to all branches of the flavonoid biosynthetic pathway (see the flavonoid biosynthesis pathway presented on page 4 of Office action), Applicants respectfully submit that upregulation of CHS would affect not only the anthocyanin and isoflavone pathways, but the aurone, flavone, flavonol, proanthocyanidin, and phlobaphene pathways as well.

In view of the amendments and the above discussion, Applicants submit that claims 1-4 and 7 are fully enabled by the specification. Applicants request that the enablement rejection under 35 U.S.C. §112, first paragraph, be withdrawn.

Nonstatutory Obviousness-Type Double Patenting

Claims 1-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 5-11 of U.S. Patent No. 7,304,207 because the conflicting claims are not patentably distinct from each other. Applicants respectfully request that this rejection be held in abeyance until the claims in this application are allowed.

Conclusion

Based on the foregoing amendments and arguments, the claims are in condition for allowance and notification to this effect is requested. If for any reason the Examiner believes that a telephone conference would expedite allowance of the claims, please telephone the undersigned at the telephone number listed below.

Respectfully submitted,

KLARQUIST SPARKMAN, LLP

One World Trade Center, Suite 1600
121 S.W. Salmon Street
Portland, Oregon 97204
Telephone: (503) 595-5300
Facsimile: (503) 595-5301

By /Anne Carlson/
Anne Carlson, Ph.D.
Registration No. 47,472